AF/1746

[11150/29]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:
Olaf DUEBEL et al

For:
FUEL CELL SYSTEM AND METHOD FOR GENERATING ELECTRICAL ENERGY USING A FUEL CELL SYSTEM

Filed: June 7, 2001

Serial No. 09/700,833

Examiner: Jonathan Crepeau
Art Unit 1746

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APPEAL BRIEF TRANSMITTAL

S I R:

Transmitted herewith for filing in the above-identified patent application, please find an Appeal Brief pursuant to 37 C.F.R. § 41.37

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Respectfully submitted,

Dated: April 14, 2005

By: _____
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42,194

[11150/29]

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BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Olaf DUEBEL et al.	Examiner: Jonathan Crepeau
For: FUEL CELL SYSTEM AND METHOD FOR GENERATING ELECTRICAL ENERGY USING A FUEL CELL SYSTEM	
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APPEAL BRIEF PURSUANT TO 37 C.F.R. § 41.37

SIR:

On February 14, 2005, Appellants submitted a Notice of Appeal from the final rejection of claims 17 to 31 contained in the Final Office Action issued by the United States Patent and Trademark Office on October 14, 2004 in the above-identified patent application.

In accordance with 37 C.F.R. § 41.37, this brief is submitted in support of the appeal of the final rejections of claims 17 to 31. For at least the reasons set forth below, the final rejections of claims 17 to 31 should be reversed.

1. REAL PARTY IN INTEREST

The real party in interest in the present appeal is Volkswagen AG, of Wolfsburg in the Federal Republic of Germany, which is the assignee of the entire right, title and interest in the present application.

2. RELATED APPEALS AND INTERFERENCES

There are no other prior or pending appeals, interferences or judicial proceedings known by the undersigned, or believed by the undersigned to be known to

Appellants or the assignee, Volkswagen AG, "which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal."

3. STATUS OF CLAIMS

Claims 1 to 16, 41, and 42 have been canceled.

Claims 32 to 40 have been allowed.

Claims 17, 19, 30, and 31 stand rejected under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 6,120,925 ("Kawatsu et al.").

Claims 17, 22 to 25, and 28 to 30 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 5,630,679 ("Buswell et al.") and Kawatsu et al.

Claims 17 to 21, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 6,165,633 ("Negishi") and Kawatsu et al.

Claims 17 to 19, 26, 27, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 6,077,620 ("Pettit") and Kawatsu et al.

Appellants appeal from the final rejections of claims 17 to 31.

A copy of the appeal claims, *i.e.*, claims 17 to 31, is attached hereto in the Appendix.

4. STATUS OF AMENDMENTS

In response to the Final Office Action issued on October 14, 2004, Appellants filed a "Reply Under 37 C.F.R. § 1.116" on December 21, 2004. However, the "Reply Under 37 C.F.R. § 1.116" did not contain any proposed amendments.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present application relates to a fuel-cell system, particularly one that includes a drive system of a motor vehicle. Specification, page 1, lines 1 to 3. Fig. 1 shows an example embodiment of a fuel-cell system. The fuel-cell system includes a reformer unit 18 that produces hydrogen from a raw material. Specification, page 8, lines 11 to 20. The reformer unit 18 includes a mixer 20 that mixes the raw material and an oxygen-containing substance. Specification, page 8, lines 13 to 20. A fuel cell unit 10 is disposed downstream of the reformer unit 18 and is operable in accordance with the produced hydrogen. Specification, page 8, line 22 to page 9, line 11. A catalytic burner 82 combusts exhaust gas

from an anode 12 of the fuel cell unit 10 to form heat energy. Specification, page 8, lines 11 to 12, and page 10, lines 4 to 5. The catalytic burner 82 passes the heat energy to the reformer unit 18 via a heat exchanger 22 of the reformer unit 18. Specification, page 10, lines 4 to 8.

An oxidation unit 34 disposed between the reformer unit 18 and the fuel-cell unit 10 converts carbon monoxide into carbon dioxide. Specification, page 8, lines 22 to 26. A water-injection device 46 is disposed at the oxidation unit 34 and injects water into the oxidation unit 34. Specification, page 8, lines 27 to 30. The oxidation unit 34 performs the conversion by a reaction of carbon monoxide with oxygen supplied by the injected water. Specification, page 5, lines 5 to 6. Based on the amount of oxygen supplied by the injected water, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation unit 34. Specification, page 5, lines 8 to 9.

To recover energy, an expander 94 is provided in a cathode-exhaust stream of the fuel cell unit 10, a compressor 96 is provided in a supply-air stream of the fuel cell unit 10, and both are arranged on a common shaft. Specification, page 6, lines 8 to 12.

Independent claim 17 relates to a fuel-cell system. Claim 17 recites that the fuel-cell system includes: a reformer unit 18 configured to produce hydrogen from a raw material (Specification, page 8, lines 11 to 20); a fuel-cell unit 10 disposed downstream of the reformer unit 18 and operable in accordance with the hydrogen produced by the reformer unit 18 (Specification, page 8, line 22 to page 9, line 11); an oxidation device 34 configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit 18 and the fuel-cell unit 10 (Specification, page 8, lines 22 to 26); and a water-injection device 46 disposed at the oxidation device 34 and configured to inject water into the oxidation device 34 (Specification, page 8, lines 27 to 30). Claim 17 further recites that the oxidation device 34 is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device 46 (Specification, page 5, lines 5 to 6) and that, based on the oxygen supplied by the water injected by the water-injection device 46, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device 34 (Specification, page 5, lines 8 to 9).

Independent claim 18 relates to a fuel-cell system. Claim 18 recites that the fuel-cell system includes: a reformer unit 18 configured to produce hydrogen from a raw material (Specification, page 8, lines 11 to 20); a fuel-cell unit 10 disposed downstream of the reformer unit 18 and operable in accordance with the hydrogen produced by the reformer unit

18 (Specification, page 8, line 22 to page 9, line 11); an oxidation device 34 configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit 18 and the fuel-cell unit 10 (Specification, page 8, lines 22 to 26); and a water-injection device 46 disposed at the oxidation device 34 and configured to inject water into the oxidation device 34 (Specification, page 8, lines 27 to 30). Claim 18 further recites that: the oxidation device 34 is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device 46 (Specification, page 5, lines 5 to 6); based on the oxygen supplied by the water injected by the water-injection device 46, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device 34 (Specification, page 5, lines 8 to 9); and the fuel-cell system includes a drive system of a motor vehicle (Specification, page 4, lines 16 to 22).

Independent claim 20 relates to a fuel-cell system. Claim 20 recites that the fuel-cell system includes: a reformer unit 18 configured to produce hydrogen from a raw material (Specification, page 8, lines 11 to 20); a fuel-cell unit 10 disposed downstream of the reformer unit 18 and operable in accordance with the hydrogen produced by the reformer unit 18 (Specification, page 8, line 22 to page 9, line 11); an oxidation device 34 configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit 18 and the fuel-cell unit 10 (Specification, page 8, lines 22 to 26); and a water-injection device 46 disposed at the oxidation device 34 and configured to inject water into the oxidation device 34 (Specification, page 8, lines 27 to 30). Claim 20 further recites that: the oxidation device 34 is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device 46 (Specification, page 5, lines 5 to 6); based on the oxygen supplied by the water injected by the water-injection device 46, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device 34 (Specification, page 5, lines 8 to 9); and the reformer unit 18 includes a mixer 20 configured to mix the raw material and an oxygen-containing substance (Specification, page 8, lines 11 to 20).

Independent claim 26 relates to a fuel-cell system. Claim 26 recites that the fuel-cell system includes: a reformer unit 18 configured to produce hydrogen from a raw material (Specification, page 8, lines 11 to 20); a fuel-cell unit 10 disposed downstream of the reformer unit 18 and operable in accordance with the hydrogen produced by the reformer unit 18 (Specification, page 8, line 22 to page 9, line 11); an oxidation device 34 configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit 18 and

the fuel-cell unit 10 (Specification, page 8, lines 22 to 26); a water-injection device 46 disposed at the oxidation device 34 and configured to inject water into the oxidation device 34 (Specification, page 8, lines 27 to 30); and a catalytic burner 82 configured to combust exhaust gas from an anode 12 of the fuel-cell unit 10 and to direct corresponding waste heat through a heat exchanger 22 to the reformer unit 18 (Specification, page 10, lines 4 to 16). Claim 26 further recites that the oxidation device 34 is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device 46 (Specification, page 5, lines 5 to 6) and that, based on the oxygen supplied by the water injected by the water-injection device 46, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device 34 (Specification, page 5, lines 8 to 9).

Independent claim 28 relates to a fuel-cell system. Claim 28 recites that the fuel-cell system includes: a reformer unit 18 configured to produce hydrogen from a raw material (Specification, page 8, lines 11 to 20); a fuel-cell unit 10 disposed downstream of the reformer unit 18 and operable in accordance with the hydrogen produced by the reformer unit 18 (Specification, page 8, line 22 to page 9, line 11); an oxidation device 34 configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit 18 and the fuel-cell unit 10 (Specification, page 8, lines 22 to 26); a water-injection device 46 disposed at the oxidation device 34 and configured to inject water into the oxidation device 34 (Specification, page 8, lines 27 to 30); an expander 94 disposed in an exhaust-gas stream 66 of a cathode 14 of the fuel-cell unit 10 (Specification, page 10, lines 23 to 29); and a compressor 96 disposed in a supply-air stream 98 of the fuel-cell unit 10 (Specification, page 10, lines 23 to 29). Claim 28 further recites that: the expander 94 and the compressor 96 are arranged on a common shaft 100 (Specification, page 10, lines 23 to 25); the oxidation device 34 is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device 46 (Specification, page 5, lines 5 to 6); and based on the oxygen supplied by the water injected by the water-injection device 46, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device 34 (Specification, page 5, lines 8 to 9).

6. GROUNDS OF REJECTIONS TO BE REVIEWED ON APPEAL

A. Claims 17, 19, 30, and 31 stand rejected under 35 U.S.C. § 102(e) as anticipated by Kawatsu et al.

B. Claims 17, 22 to 25, and 28 to 30 stand rejected under 35 U.S.C. § 103(a) as patentable over the combination of Buswell et al. and Kawatsu et al.

C. Claims 17 to 21, 30, and 31 stand rejected under 35 U.S.C. § 103(a)as patentable over the combination of Negishi and Kawatsu et al.

D. Claims 17 to 19, 26, 27, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as patentable over the combination of Pettit and Kawatsu et al.

7. ARGUMENTS

A. Rejection of Claims 17, 19, 30, and 31 Under 35 U.S.C. § 102(e)

Claims 17, 19, 30, and 31 stand rejected under 35 U.S.C. § 102(e) as anticipated by Kawatsu et al. It is respectfully submitted that Kawatsu et al. do not anticipate any of claims 17, 19, 30, and 31 for at least the following reasons.

It is "well settled that the burden of establishing a *prima facie* case of anticipation resides with the [United States] Patent and Trademark Office." *Ex parte Skinner*, 2 U.S.P.Q.2d 1788, 1788 to 1789 (Bd. Pat. App. & Inter. 1986). To anticipate a claim, each and every element as set forth in the claim must be found in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of Calif.*, 814 F.2d 628, 631, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987). Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). That is, the prior art must describe the elements arranged as required by the claims. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

Claim 17 relates to a fuel-cell system and recites that the fuel-cell system includes an oxidation device configured to convert carbon monoxide into carbon dioxide and includes a water-injection device configured to inject water into the oxidation device. Claim 17 further recites that the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen of the water injected by the water-injection device. Claim 17 further recites that a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device based on the oxygen of the injected water.

Kawatsu et al. purport to relate to an apparatus for and method of reducing a concentration of carbon monoxide and a fuel-cells generator system with such an apparatus. While Kawatsu et al. mention that a supply of water is fed to a selective CO oxidizing unit, nowhere do Kawatsu et al. disclose, or even suggest, a system in which a reduced amount of

supplemental oxygen containing gas is supplied based on an amount of oxygen supplied by injected water. Kawatsu et al. discuss the control of a supply of an oxidizing gas, for example, based on a concentration of carbon monoxide in a hydrogen-rich gas, and the control of a supply of water, for example, based on the amount of supplied oxidizing gas, col. 3, lines 14 to 23, but nowhere do Kawatsu et al. disclose the reverse. That is, nowhere do Kawatsu et al. disclose, or even suggest, that based on oxygen supplied by water injected by a water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device, as recited in claim 17.

Furthermore, while Kawatsu et al. mention that a supply of water is fed to a selective CO oxidizing unit, the water is only supplied to *cool* selective CO oxidizing catalysts stored in the selective CO oxidizing unit. That is, Kawatsu et al. do not disclose, or even suggest, that the CO oxidizing unit is configured to oxidize carbon monoxide into carbon dioxide by a reaction with oxygen of the supplied water. Rather, Kawatsu et al. describe feeding an *oxygen-containing oxidizing gas* to the oxidizing unit and state that "[t]he catalyst in the oxidizing unit enables oxygen *included in the introduced oxidizing gas* to be bonded to the carbon monoxide," col. 2, lines 28 to 30 (emphasis added).

The Final Office Action at paragraph 7 alleges that Kawatsu et al. disclose "catalyst species [that] are at least *capable* of catalyzing a water shift reaction" (italics in original). Even if Kawatsu et al. disclose "catalyst species [that] are at least *capable* of catalyzing a water shift reaction," which Appellants do not concede, such disclosure does not constitute a disclosure or suggestion that an "oxidation device is *configured* to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by . . . water injected by [a] water-injection device" as recited in claim 17. Indeed, the Final Office Action has not set forth a basis in fact that the catalysts of Kawatsu et al. are necessarily configured to convert carbon monoxide into carbon dioxide by a reaction of the carbon monoxide with oxygen supplied by injected water, and the Final Office Action at paragraph 9 even ***admits*** that "the water does not participate in the oxidation reaction." The Office Action of October 14, 2004 also admitted on page 8 that according to Kawatsu et al., "the water does not participate in the oxidation reaction." Furthermore, nowhere do Kawatsu et al. indicate that water is injected into the catalysts while carbon monoxide of the hydrogen-rich gas is present in the catalysts.

The Advisory Action alleges that a catalyst that is capable of oxidizing CO with water is "configured" to do so. As indicated in the decision of *In re Venezia*, 530 F.2d 956, 189 U.S.P.Q. 149 (C.C.P.A. 1976), the phrase "adapted to" sets forth "present structures

or attributes." The court in *In re Venezia* stated that "adapted to" language "rather than describing activities which may or may not occur, serves to precisely define present structural attributes." *Id.* at 960. Claim 17 does not merely recite an intended use of an oxidation device to convert carbon monoxide into carbon dioxide by a reaction with oxygen supplied by water injected by a water-injection device. Rather claim 17 serves to precisely define a present structural attribute of the oxidation device to be that the oxidation device is structured for communication with water injected by the water-injection device, such that the oxidation device converts carbon monoxide into carbon dioxide by a reaction with the injected water. By contrast, Kawatsu et al. do not disclose, or even suggest, that the catalyst (referred to in the Final Office Action as allegedly disclosing the recited oxidation device) is provided with the structural attribute of being in such communication with a water-injection device that, when the catalyst is in use, it converts carbon monoxide into carbon dioxide by a reaction of the carbon monoxide with water injected by the water-injection device. Thus, the catalyst of Kawatsu et al. is not structured as is the oxidation device of claim 17.

The Final Office Action and the Advisory Action appear to characterize the feature that "the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device" as functional. This is nothing than a mischaracterization of this feature, which is ***structural***, rather than functional. There is nothing in the structural configuration of the apparatus described by Kawatsu et al. that is "configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device."

Moreover, the statement that "the apparatus per se of Kawatsu [et al.] is still 'configured to' perform the claimed reaction, ***when the reaction conditions are set in the appropriate manner***" is further evidence that some modification of Kawatsu et al. must be made in order to achieve the subject matter claimed. Therefore, it is plainly apparent that Kawatsu et al. do not anticipate claim 17.

Since Kawatsu et al. do not disclose, or even suggest, at least an "oxidation device configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water injection-device" or that "based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device" as recited in claim 17, it is therefore respectfully submitted that Kawatsu et al. do not anticipate claim 17.

As for claims 19, 30, and 31, which ultimately depend from claim 17 and therefore include all of the features recited in claim 17, it is respectfully submitted that Kawatsu et al. do not anticipate these dependent claims for at least the same reasons set forth above in support of the patentability of claim 17.

In view of all of the foregoing, reversal of this rejection is respectfully requested.

B. Rejection of Claims 17, 22 to 25, and 28 to 30 Under 35 U.S.C. § 103(a)

Claims 17, 22 to 25, and 28 to 30 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Buswell et al. and Kawatsu et al. It is respectfully submitted that the combination of Buswell et al. and Kawatsu et al. does not render unpatentable any of claims 17, 22 to 25, and 28 to 30 for at least the following reasons.

As indicated above, claim 17 recites that the oxidation device is configured to convert carbon monoxide by a reaction with oxygen of water injected by the water-injection device, and that a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device based on the oxygen of the injected water.
Claim 28 also recites these features.

As further indicated above, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claim 17. Similarly, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claim 28. Buswell et al. are not relied upon for disclosing or suggesting the features recited in claims 17 and 28 not disclosed or suggested by Kawatsu et al. Indeed, it is respectfully submitted that Buswell et al. do not disclose or suggest the features recited in claims 17 and 28 not disclosed or suggested by Kawatsu et al. It is therefore respectfully submitted that the combination of Buswell et al. and Kawatsu et al. does not render unpatentable claims 17 and 28.

As for claims 22 to 25, and 28 to 30, which ultimately depend from claim 17 and therefore include all the features recited in claim 17, it is respectfully submitted that the combination of Buswell et al. and Kawatsu et al. does not render unpatentable these dependent claims for at least the same reasons set forth above in support of the patentability of claim 17. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988) (any dependent claim that depends from a non-obvious independent claim is non-obvious).

In view of the foregoing, reversal of this rejection is therefore respectfully requested.

C. **Rejection of Claims 17 to 21, 30, and 31 Under 35 U.S.C. § 103(a)**

Claims 17 to 21, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Negishi and Kawatsu et al. It is respectfully submitted that the combination of Negishi and Kawatsu et al. does not render unpatentable any of claims 17 to 21, 30, and 31 for at least the following reasons.

As indicated above, claim 17 recites that the oxidation device is configured to convert carbon monoxide by a reaction with oxygen of water injected by the water-injection device, and that a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device based on the oxygen of the injected water.

Claims 18 and 20 also recite these features.

As further indicated above, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claim 17. Similarly, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claims 18 and 20. Negishi is not relied upon for disclosing or suggesting the features recited in claims 17, 18, and 20 not disclosed or suggested by Kawatsu et al. Indeed, it is respectfully submitted that Negishi does not disclose or suggest the features recited in claims 17, 18, and 20 not disclosed or suggested by Kawatsu et al. It is therefore respectfully submitted that the combination of Negishi and Kawatsu et al. does not render unpatentable claims 17, 18, and 20.

Claims 19, 30, and 31 ultimately depend from claim 17 and therefore include all of the features recited in claim 17. It is therefore respectfully submitted that the combination of Negishi and Kawatsu et al. does not render unpatentable these dependent claims for at least the same reasons set forth above in support of the patentability of claim 17. *In re Fine, supra.*

Claim 21 depends from claim 20 and therefore includes all of the features recited in claim 20. It is therefore respectfully submitted that the combination of Negishi and Kawatsu et al. does not render unpatentable dependent claim 20 for at least the same reasons set forth above in support of the patentability of claim 21. *Id.*

In view of all of the foregoing, reversal of this rejection is therefore respectfully requested.

D. **Rejection of Claims 17 to 19, 26, 27, 30, and 31 Under 35 U.S.C. § 103(a)**

Claims 17 to 19, 26, 27, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Pettit and Kawatsu et al. It is respectfully submitted

that the combination of Pettit and Kawatsu et al. does not render unpatentable any of claims 17 to 19, 26, 27, 30, and 31 for at least the following reasons.

As indicated above, claims 17 and 18 recite that the oxidation device is configured to convert carbon monoxide by a reaction with oxygen of water injected by the water-injection device, and that a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device based on the oxygen of the injected water.

Claim 26 also recites these features.

As further indicated above, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claims 17 and 18. Similarly, Kawatsu et al. do not disclose, or even suggest, all of the features recited in claim 26. Pettit is not relied upon for disclosing or suggesting the features recited in claims 17, 18, and 26 not disclosed or suggested by Kawatsu et al. Indeed, it is respectfully submitted that Pettit does not disclose or suggest the features recited in claims 17, 18, and 26 not disclosed or suggested by Kawatsu et al. It is therefore respectfully submitted that the combination of Pettit and Kawatsu et al. does not render unpatentable claims 17, 18, and 26.

Claims 19, 30, and 31 ultimately depend from claim 17 and therefore include all of the features recited in claim 17. It is therefore respectfully submitted that combination of Pettit and Kawatsu et al. does not render unpatentable these dependent claims for at least the same reasons set forth above in support of the patentability of claim 17. *Id.*

Claim 27 depends from claim 26 and therefore includes all of the features recited in claim 26. It is therefore respectfully submitted that combination of Pettit and Kawatsu et al. does not render unpatentable dependent claim 27 for at least the same reasons set forth above in support of the patentability of claim 26. *Id.*

In view of the foregoing, reversal of this rejection is therefore respectfully requested.

8. CONCLUSION

For at least the reasons indicated above, Appellants respectfully submit that the art of record does not disclose or suggest the subject matter as recited in the claims of the above-identified application. Accordingly, it is respectfully submitted that the subject matter invention recited in the claims of the present application is new, non-obvious and useful.

In view of all of the foregoing, reversal of all of the rejections set forth in the Final Office Action is therefore respectfully requested.

Respectfully submitted,

Dated: April 14, 2005 By: _____

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APPENDIX

17. A fuel-cell system, comprising:

a reformer unit configured to produce hydrogen from a raw material;

a fuel-cell unit disposed downstream of the reformer unit and operable in accordance with the hydrogen produced by the reformer unit;

an oxidation device configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit and the fuel-cell unit; and

a water-injection device disposed at the oxidation device and configured to inject water into the oxidation device;

wherein the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device; and

wherein, based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device.

18. A fuel-cell system comprising:

a reformer unit configured to produce hydrogen from a raw material;

a fuel-cell unit disposed downstream of the reformer unit and operable in accordance with the hydrogen produced by the reformer unit;

an oxidation device configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit and the fuel-cell unit; and

a water-injection device disposed at the oxidation device and configured to inject water into the oxidation device;

wherein the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device;

wherein, based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device; and

wherein the fuel-cell system includes a drive system of a motor vehicle.

19. The fuel-cell system according to claim 17, wherein the raw material includes a liquid raw material.

20. A fuel-cell system comprising:

a reformer unit configured to produce hydrogen from a raw material;

a fuel-cell unit disposed downstream of the reformer unit and operable in accordance with the hydrogen produced by the reformer unit;

an oxidation device configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit and the fuel-cell unit; and

a water-injection device disposed at the oxidation device and configured to inject water into the oxidation device;

wherein the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device;

wherein, based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device; and

wherein the reformer unit includes a mixer configured to mix the raw material and an oxygen-containing substance.

21. The fuel-cell system according to claim 20, wherein the oxygen-containing substance includes at least one of water and air.

22. The fuel-cell system according to claim 17, further comprising a two-stage compressor configured to supply compressed air to at least one of a process gas between the oxidation device and the fuel-cell unit and a cathode of the fuel-cell unit.

23. The fuel-cell system according to claim 17, further comprising a water separation device disposed in at least one of an exhaust-gas stream from a cathode of the fuel-cell unit, an exhaust-gas stream from an anode of the fuel-cell unit and a cleaned-gas stream from the oxidation unit, the water separating device being configured to separate the water contained in the corresponding gas and to supply the water to a water-storage device disposed upstream from the reformer unit.

24. The fuel-cell system according to claim 23, wherein the water separation device includes a condenser.

25. The fuel-cell system according to claim 23, further comprising a water circulation loop configured to cool at least one of the water separation device, the fuel-cell unit, air supplied to a cathode of the fuel-cell unit and air supplied to the reformer unit.

26. A fuel-cell system comprising:

a reformer unit configured to produce hydrogen from a raw material;

a fuel-cell unit disposed downstream of the reformer unit and operable in accordance with the hydrogen produced by the reformer unit;

an oxidation device configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit and the fuel-cell unit;

a water-injection device disposed at the oxidation device and configured to inject water into the oxidation device; and

a catalytic burner configured to combust exhaust gas from an anode of the fuel-cell unit and to direct corresponding waste heat through a heat exchanger to the reformer unit;

wherein the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device, and

wherein, based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device.

27. The fuel-cell system according to claim 26, wherein the catalytic burner is connected to a supply tank supplying the raw material.

28. A fuel-cell system comprising:

a reformer unit configured to produce hydrogen from a raw material;

a fuel-cell unit disposed downstream of the reformer unit and operable in accordance with the hydrogen produced by the reformer unit;

an oxidation device configured to convert carbon monoxide into carbon dioxide and disposed between the reformer unit and the fuel-cell unit;

a water-injection device disposed at the oxidation device and configured to inject water into the oxidation device;

an expander disposed in an exhaust-gas stream of a cathode of the fuel-cell unit; and

a compressor disposed in a supply-air stream of the fuel-cell unit;

wherein the expander and the compressor are arranged on a common shaft;

wherein the oxidation device is configured to convert carbon monoxide into carbon dioxide by a reaction of carbon monoxide with oxygen supplied by the water injected by the water-injection device; and

wherein, based on the oxygen supplied by the water injected by the water-injection device, a reduced amount of a supplemental oxygen containing substance is supplied to the oxidation device.

29. The fuel-cell unit according to claim 28, wherein the compressor includes a two-stage compressor.

30. The fuel-cell unit according to claim 17, wherein the raw material includes a hydrogen-containing substance.

31. The fuel-cell unit according to claim 30, wherein the hydrogen-containing substance includes at least one of methanol and gasoline.